

Name:

Solutions

Directions: Be careful to **give factors** when the question says "Factor" and **give zeros or solutions** when the question says "Solve".

1. **Solve**  $x^2 + 6x - 27 = 0$  for real & rational solutions only

$$(x+9)(x-3) = 0$$

$$x = -9 \quad x = 3$$

$$\{-9, 3\}$$

2. Factor  $9x^2 - 64$  Difference of Squares

$$(3x-8)(3x+8)$$

3. **Solve**  $3x^2 - 5x - 28 = 0$  for real & rational solutions only

~~$$(3x-7)(x+4) = 0$$~~

$$(3x+7)(x-4) = 0$$

$$3x+7=0 \quad x-4=0$$

$$\{-\frac{7}{3}, 4\}$$

4. Factor  $y^3 - 8k^3$

$$(y)^3 - (2k)^3 = (y-2k)(y^2 + 2ky + 4k^2)$$

5. **Solve**  $6m^2 - 24m = 0$  for real & rational solutions only

GCF:  $6m$

$$6m(m-4) = 0$$

$$6m = 0 \quad m-4 = 0$$

$$m = 0 \quad m = 4$$

$$\{0, 4\}$$

6. Factor  $2y^3 - 12y^2 - 32y$

GCF:  $2y$

$$2y(y^2 - 6y - 16)$$

$$2y(y-8)(y+2)$$

7. Solve  $x^4 - 21x^2 - 100 = 0$  for real & rational solutions only

$$(x^2 - 25)(x^2 + 4) = 0$$

$$\downarrow$$

$$(x - 5)(x + 5)(x^2 + 4) = 0$$

real rational zeros only  
 $\{5, -5\}$

8. Factor  $x^3 - 2x^2 + 9x - 18$  Factor by Grouping

$$x^2(x - 2) + 9(x - 2)$$

$$(x - 2)(x^2 + 9)$$

9. Solve  $x^3 + 3x^2 - 18x - 40 = 0$  for real & rational solutions only (Hint:  $x + 2$  is one factor of the polynomial)

If  $x + 2$  is a factor, then  $x = -2$  is a zero.

$$\begin{array}{r|rrrr} -2 & 1 & 3 & -18 & -40 \\ & & -2 & -2 & 40 \\ \hline & 1 & 1 & -20 & 0 = \text{Remainder} \end{array}$$

$$x^2 + x - 20 = 0$$

$$(x + 5)(x - 4) = 0$$

$\{-2, -5, 4\}$

10. A polynomial function of degree 3 has the solution set  $\{0, -3, 7\}$ . Determine an equation of the function in standard form.

$$x = 0 \quad x = -3 \quad x = 7$$

$$x = 0 \quad x + 3 = 0 \quad x - 7 = 0$$

$$x(x + 3)(x - 7) = 0$$

$$x(x^2 - 4x - 21) = 0$$

$$x^3 - 4x^2 - 21x = 0$$

11. A polynomial function of degree 3 has the solution set  $\left\{-4, \frac{-2}{3}\right\}$  where  $-4$  is a double root. Determine an equation of the function in standard form.

$$x = -4 \quad x = -4 \quad x = \frac{-2}{3} \quad 3x = -2 \quad 3x + 2 = 0$$

$$x + 4 = 0 \quad x + 4 = 0 \quad 3x + 2 = 0$$

$$(x + 4)(x + 4)(3x + 2) = 0$$

$$(x^2 + 8x + 16)(3x + 2) = 0$$

$$3x^3 + 24x^2 + 48x + 2x^2 + 16x + 32 = 0$$

$$3x^3 + 26x^2 + 64x + 32 = 0$$